## REMARKS

Claims 1-20 are in this application and are presented for consideration. By this Amendment, Applicant has amended claims 1, 5-7, 9, 12, 17 and 18.

Claims 12 and 17 have been objected to because of minor informalities. Applicant has amended claims 12 and 17 to address these issues. Applicant wishes to thank the Examiner for the careful review of the claims.

Claims 1-20 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Applicant has amended the claims paying close attention to the Examiner's remarks. Applicant wishes to thank the Examiner for the helpful comments. It is Applicant's position that the claims as now presented are clear and fully comply with the requirements of the statute.

The Office Action states that in considering the patentability of the claims under 35 U.S.C. 103(a), the Examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. To the best of Applicant's knowledge, the subject matter of the various claims was commonly owned at the time the invention was made.

Claims 1-4, 12-15 and 17-20 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Myers et al. (U.S. 5,400,950) in view of Gotman (U.S. 4,404,453).

The present invention relates to a process for producing a contact structure for connecting two substrates. The process comprises the step of applying solder material to

terminal areas of a first substrate to form electrically conductive spacing metallizations with the solder material. The spacing metallizations are in direct contact with the terminal areas of the first substrate. The process further comprises the step of bonding the first substrate with a second substrate. The bonding between the terminal areas of the first substrate and a contact surface area of the second substrate is performed by means of a partial fusion of the spacing metallizations during the bonding action. The partial fusion of the spacing metallizations leaves an essential part of the spacing metallizations in its solidified state for providing spacing between the terminal areas and the contact surface area. The process advantageously allows good electrical connection, a good mechanical connection and provides for is the necessary spacing with a simple and effective procedure. The prior art as a whole fails to disclose such features or advantages.

Myers et al. relates to a method for controlling solder bump height for flip chip integrated circuit devices. A flip chip 12 is mounted to a circuit board, which is represented by a substrate 10. A number of bead-like projections are formed on one surface of the flip chip 12 to serve as terminals. These projections electrically interconnect the flip chip 12 to a conductor pattern formed on the substrate 10. The solder bumps 16 are positioned on the flip chip 12 such that, when registered with a conductor pattern on the substrate 10, each of the solder bumps 16 are mated with a corresponding conductor 14. The height of the solder bumps 16 is determined by the effect of a number electrically inactive, dummy solder bumps 20. The solder bumps 20 are positioned on a pad 22 formed on the substrate 10. The solder bumps 16 are deposited on a surface of the flip chip 12 to bond the flip chip 12 to the substrate 10. The

flip chip 12 is then soldered to the substrate 10 using a reflow technique which heats the solder bumps 16 and dummy bumps 20 to a temperature above the melting point of the solder alloy.

Myers et al. fails to teach or suggest the combination of an electrically conductive spacing between the terminal areas of the first substrate and a contact surface area of a second substrate. This electrically conductive spacer is significant in the present invention because it provides for a good electrical connection while achieving a spacing function between the first substrate and the second substrate. Myers et al. fails to teach or suggest that the dummy bumps 20 serve as an electrical connection. In fact, Myers et al. merely suggests that the dummy bumps 20 provide for only a spacing function. Myers et al. clearly discloses that the dummy bumps 20 are electrically inactive. (Column 5, lines 35-36). As such, Myers et al. only suggests that the dummy bumps 20 serve as spacers and disadvantageously fail to provide any electrical conductivity. In the present invention, the spacing metallizations advantageously provide both a mechanical and an electrical function. The dummy bumps 20 disclosed in Myers et al. fail to provide such a duel function.

Myers et al. also fails to teach and fails to suggest the combination of connecting each spacing metallizations at one end to a first substrate by partially melting the spacing metallization and connecting the other end of spacing metallization to a second substrate via conductive adhesive after attaching the spacing metallization to the first substrate. Myers et al. merely discloses that solder bumps 20 are positioned on a pad 22 formed on the substrate 10 and are heated to attach to a chip 12. However, the reference is completely void of any teaching for fusing one end of a spacing metallization to a first substrate by partially melting the

spacing metallization and attaching another end of the spacing metallization to a second substrate by conductive adhesive. This advantageously allows good electrical connection and an excellent mechanical connection between the first substrate and the second substrate. Myers et al. fails to provide such connection advantages since Myers et al. is void of any suggestion or teaching for spacing metallizations that are connected at one end via a conductive adhesive to a second substrate as claimed. As such, the prior art as a whole takes a different approach and fails to teach or suggest the features or advantages of the present invention.

Gotman fails to provide any teaching or suggestion which would lead the person of ordinary skill in the art toward the combination claimed. Gotman discloses bonding a chip 20 and substrate 10 by backwards heating the chip 20 to melt solder globules 22 and 12 arranged on contact pairs 21 and 11. However, the references together provide no basis which would lead or direct the person of ordinary skill in the art toward the combination as claimed. Gotman fails to teach or suggest the combination of fusing the spacing metallizations during bonding of a first substrate and a second substrate. At most, Gotman teaches that the partial liquidification of solder globules 72 is provided on the contact surface of a first substrate 70 which is to be bonded to chip 60 having solder globules 62. As such, the partial liquidifcation of the solder globules 72 of Gotman takes place before the partially liquified globules 72 come into contact with the rigid solder globules 62. It is only upon contact of the partially liquified globules 72 with the rigid solder globules 62 of Gotman that the bonding action takes places in globules 72 being in a liquified state (Column 4, lines 23-31). In contrast to Gotman, the partial fusion of the spacing metallizations is performed <u>during</u> the bonding action and <u>not before</u> the bonding

action as in the case with the process disclosed in Gotman. As such, the prior art as a whole takes a different approach and fails to disclose each feature of the claimed combination.

Gotman also fails to teach and fails to suggest the combination of bonding a first substrate to a second substrate via a conductive adhesive after a portion of each spacing metallizations has been melted to attach the spacing metallizations to the first substrate. Gotman merely discloses bonding a chip 20 and substrate 10 by backwards heating the chip 20 to melt solder globules 22 and 12 arranged on contact pairs 21 and 11. However, the reference is completely void of any teaching for fusing one end of a spacing metallization to a first substrate by partially melting the spacing metallization and attaching another end of the spacing metallization to a second substrate by conductive adhesive. This advantageously allows good electrical connection and excellent mechanical connection between the first substrate and the second substrate. Gotman fails to provide such electrical connection advantages since Gotman is void of any suggestion or teaching for bonding a portion of a spacing metallization to a second substrate via a conductive adhesive as claimed. As such, the prior art as a whole takes a different approach and fails to teach or suggest the features or advantages of the present invention. Accordingly, Applicant respectfully requests that the Examiner favorably consider claims 1, 12 and 17 and all claims that respectively depend thereon.

Claims 5-9 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Myers et al. in view of Leicht et al. (U.S. 5,551,627). Although Leicht et al. teaches a solder connection structure that uses different types of materials that have different melting temperatures, the references as a whole fail to suggest the combination of features claimed.

Specifically, Myers et al. and Gotman fail to teach or suggest the combination of fusing the spacing metallizations during bonding of a first substrate and a second substrate. The references do not suggest the invention and therefore all claims define over the prior art as a whole.

Claims 10, 11 and 16 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Myers et al. in view of Beddingfield et al. (U.S. 5,710,071). As previously discussed above, Myers et al. fails to teach or suggest the combination of fusing one end of a spacing metallization to a first substrate by partially melting the spacing metallization and attaching another end of the spacing metallization to a second substrate by conductive adhesive. As such, the references as a whole fail to suggest the combination of features claimed. Accordingly, all claims define over the prior art as a whole.

Favorable consideration on the merits is requested.

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